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Characterization of Metal-Matrix Composites through Component Properties*

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ABSTRACT

Metal matrix composite (MMC) parts are commonly cast by infiltrating molten metal into porous, preformed shapes composed of matrix material. The shapes or "preforms" allow selective reinforcement of the casting, reduction of the amount of reinforcing material, and separate control of the distribution and orientation of the reinforcement. Design requirements of the cast MMC part determine the fiber concentration, fiber orientation, and shape of the preform. Our goal is to confirm the performance parameters of MMC parts through characterization of metal and preformed matrix components.

We compared theoretical predictions for resultant properties of composites with measured MMC properties found using ultrasonic velocity measurements. The theoretical predictions use measured properties of the individual metal and preformed fiber components. MMC properties with low concentrations of matrix show good agreement with the theory. The accuracy of predictions for MMC with higher concentrations of matrix depend on the degree of anisotropy and the extent of fiber alignment.

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